

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/003242

International filing date (day/month/year)
28.07.2004

Priority date (day/month/year)
30.07.2003

International Patent Classification (IPC) or both national classification and IPC
C02F1/44

Applicant
UNIVERSITY OF SURREY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

26 Jan 2005

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

10/566389

International application No.
PCT/GB2004/003242

IP20 Rec'd PCT/PTO 30 JAN 2006

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/003242

Box No. II Priority

1. ☒ The following document has not been furnished:
- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
 - ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).
- Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-22
Inventive step (IS)	Yes: Claims	
	No: Claims	1-22
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

IAP20 Rec'd PCT/PTO 30 JAN 2006

Re Item V.

1 The following documents are referred to in this communication:

- D1: US 5 281 430 A (HERRON JOHN R ET AL) 25 January 1994 (1994-01-25)
- D2: US 3 532 621 A (HOUGH WILLIAM THOMAS) 6 October 1970 (1970-10-06)
- D3: WO 97/18166 A (OSMOTEX INC) 22 May 1997 (1997-05-22)
- D4: US 4 781 837 A (LEFEBVRE MICHEL S M) 1 November 1988 (1988-11-01)
- D5: WO 99/39799 A (MCGINNIS ROBERT L) 12 August 1999 (1999-08-12)

1 The principle of the direct or forward osmosis process is well known in the art. Documents D1-D5 are examples of typical embodiments and applications. It is an compulsory feature that the membrane is dense for the respective solutes used on the permeate side (which are known as "osmotic agents"). Thus the pore size is directly dependent on the osmotic agent used i.e. if the osmotic agent in the prior art is the same as in the application, the pore size is also implicitly disclosed.

2 Novelty

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-22 is not novel.

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-18, 21 and 22** is not new in the sense of Article 33(2) PCT in the light of D4.

Document D4 discloses (the references in parenthesis applying to this document): A process for the desalination of seawater comprising a membrane module for osmotic distillation with a MgSO_4 osmotic agent second solution circulated in a recycle loop comprising a reverse osmosis extraction step (fig. 2). It is implicitly given, that the pressure resulting from the osmotic distillation increases the driving force of the reverse osmosis process.

Fig. 1 shows a different embodiment (fruit juice concentration), where seawater is used as second solution. Seawater comprises both MgSO_4 and NaCl .

2.2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-5, 7-13, 17 and 20-22** is not new in the sense of Article 33(2) PCT in the light of D1.

Document D1 discloses (the references in parenthesis applying to this document):

A process for direct osmosis concentration of products with sucrose, fructose or glucose as osmotic agents (col. 10, ll 40-44). In the recycling loop an evaporation step is foreseen (fig. 3).

Example 4 further discloses the use of an anti-fouling and anti-scaling agent (Ultrasil).

- 2.3 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-4, 7-17, 19, 21 and 22** is not new in the sense of Article 33(2) PCT in the light of D3.

Document D3 discloses (the references in parenthesis applying to this document): A direct osmosis process using salt or sugar as osmotic agents (p. 7, ll 17-22) and being combined with reverse osmosis (fig. 3) or electrodialysis (fig. 6).

Embodiments with series of direct osmosis steps are further disclosed (fig. 12 and 14).

- 2.4 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-4, 7-9, 11-13, 15-17, 21 and 22** is not new in the sense of Article 33(2) PCT in the light of D2.

D2 discloses the combination with a precipitation unit as solvent recovery step. For further details reference is made to the citation in the search report.

- 2.5 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-5, 7-13, 15-17, 19, 21 and 22** is not new in the sense of Article 33(2) PCT in the light of D5.

D5 discloses a multi-step direct osmosis (cf. fig. 1 and 2) for the treatment of seawater or industrial wastewater using sucrose or salts as osmotic agents (p. 10, l. 23 - p. 11, l. 2) combination with a precipitation unit as solvent recovery step. For further details reference is made to the citation in the search report.

Re Item VIII.

- I The option "reverse osmosis" is listed twice in claim 3.
- ii Back references of claims 8, 11-14, 17, 19 and 20 are incorrect as they include references to both independent claims 1 and 7.
- iii The subject matter of claim 11 does not disclose a technical feature.

- iv The effect as described by the subject matter of claim 17 is inherently involved with the process of direct osmosis. The claimed subject matter thus is regarded to be a discovery.